

REDACTED

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

HYDRO-PHOTON, INC.,
a Maine Corporation

Plaintiff,

v.

MERIDIAN DESIGN, INC., a California
Corporation

Defendant.

Civil Action No. 05-11240 GAO

**DECLARATION OF KEVIN GANNON, ESQ. IN SUPPORT OF HYDRO-PHOTON, INC.'S
CROSS MOTION FOR PARTIAL SUMMARY JUDGMENT**

I, Kevin Gannon, do hereby state and depose as follows:

1. I am an attorney at Cesari and McKenna, LLP, and am counsel to Plaintiff Hydro-Photon, Inc. ("HPI").

2. I submit this declaration on personal knowledge and belief in support of Plaintiff Hydro-Photon, Inc.'s Memorandum in Opposition to Defendant Meridian Design, Inc.'s Motion for Summary Judgment of Noninfringement and in Support of Plaintiff's Cross Motion for Partial Summary Judgment of Infringement. To the extent that matters herein are stated on information and belief, I believe them to be true.

3. Attached hereto as Exhibit A is a true and accurate copy the patent application filed by HPI directed to its water purification system Serial No. 08/790,750, filed on January 1, 1997 (the "'750 application").

4. Attached hereto as Exhibit B is a true and accurate copy the Amendment in the '750 application dated July 17, 1997.

5. Attached hereto as Exhibit C is a true and accurate copy the Amendment in the '750 application dated November 18, 1997.

6. Attached hereto as Exhibit D is a true and accurate copy the Amendment After Final Rejection in the '750 application dated December 4, 1998.

7. Attached hereto as Exhibit E is a true and accurate copy an Amendment dated June 23, 1999 to the patent application filed by HPI directed to its water purification system Serial No. 09/256,054, filed on February 23, 1999 (the '054 application").

8. Attached hereto as Exhibit F is a true and accurate copy the Amendment in the '054 application dated November 18, 1999.

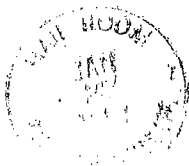
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SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY THIS 28 DAY OF
NOVEMBER 2005.



Kevin Gannon, Esq.

EXHIBIT A



108030-0001

UNITED STATES PATENT APPLICATION

of

Miles Maiden

and

Robert Watkins

for

**HAND-HELD ULTRAVIOLET WATER PURIFICATION
SYSTEM**

- 10 -

ABSTRACT

A hand-held water purification system includes a pen-light sized ultraviolet lamp that is enclosed in a quartz cover and is powered by a battery and associated ballast circuitry. The battery and ballast circuitry are connected to the lamp by switches that are under the control of a liquid-level sensor. The sensor connects the battery, the ballast circuitry and the lamp once the sensor determines that the ultraviolet lamp is fully immersed in the water. If the container that holds the water is relatively large, the lamp and quartz cover end of the system are used to stir the water, to ensure that all of the water comes sufficiently close to the ultraviolet lamp.

08/790,750



- 1 -

FIELD OF THE INVENTION

The invention relates to systems for disinfecting water using ultraviolet light.

BACKGROUND OF THE INVENTION

5 It is known that ultraviolet ("UV") light in the germicidal range, of approximately 254nm, can be used to disinfect water, that is, to rid water of bacteria, viruses, algae and so forth. Known prior water purification systems that use UV light are large, installed systems that
10 each include a flow-through subsystem, which causes water to travel past an elongated UV light source that is suspended therein. A quartz sleeve surrounds the UV light source, to protect it and its electrical connections from the water while allowing the UV radiation to pass to the water. Such systems are currently used to purify water for use in, for example,
15 hospitals or schools.

The flow-through subsystems each essentially include a flow-through chamber, i.e., a pipe. As water flows through the pipe, it travels past the quartz sleeve, and thus, the UV light source, and is exposed to UV radiation. The UV radiation kills the bacteria, viruses and so forth
20 that are present in the water. Waste byproducts may build up on the quartz sleeve, and accordingly, the systems include wiper mechanisms that periodically clean the quartz sleeves. These systems typically include a mechanism, such as a viewing port and/or a sensor, for determining the output level of the lamp. A user can visually check the
25 lamp through the view port to ensure both that the lamp is turned on and

- 2 -

that the quartz sleeve is sufficiently clean to pass the level of UV radiation required to disinfect the water. The sensor measures the UV radiation for the same purpose.

These flow-through systems work well for disinfecting relatively large quantities of water. They are not, however, suitable for disinfecting small quantities of water.

Today campers, hikers, travelers and the like encounter bacteria and virus infected water in streams, lakes and rivers, and in some countries even in the local plumbing. These hikers, campers and travelers must thus either carry bottled water with them or use portable filtering systems and/or chlorine, hydrogen peroxide or iodine tablets, to disinfect the water. The filtering systems are generally bulky, and thus, inconvenient to carry. Further, while they may remove bacteria and algae from the water, they do not remove viruses, which are typically too small to be caught in the filters. The chemical tablets are certainly portable but they are relatively expensive. Further, the tablets change the taste and smell of the water and add undesirable chemical byproducts to the water. Indeed, the tablet manufacturers generally warn against continuous use of the tablets, for health reasons.

SUMMARY OF THE INVENTION

The invention is a portable, hand-held water purifier that uses UV light to disinfect small quantities, or batches, of water. The water purifier, which is approximately the size and shape of a pen light, has extending from one end a small UV lamp with a quartz cover. The

- 3 -

cover, and thus, the lamp, are dipped into a container of water and the lamp is then turned on, to rid the water of infectious agents. As necessary, the user may use the lamp end of the system to agitate the water, to ensure that all of the water passes sufficiently close to the lamp.

5 The system, which is battery-operated, further includes a liquid-level sensor at the base of the UV lamp. The sensor prevents the lamp from turning on until the lamp is fully immersed in the water. The container and the water act to shield the UV radiation, such that very little is emitted from the container. This prevents potentially harmful
10 UV radiation from reaching the user and, in particular, the user's eyes.

BRIEF DESCRIPTION OF THE DRAWINGS

15 The above and further advantages of the invention may be better understood by referring to the following description in conjunction with the accompanying drawings, in which:

 Fig. 1 is a cut away side view of a portable water purification system constructed in accordance with the invention; and

 Fig. 2 illustrates the portable water purification system of Fig. 1 in use.

20

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

 Fig. 1 illustrates a portable, hand-held water purification system 10 for disinfecting water in relatively small batches. The system includes,

- 4 -

extending from a first end 11, a pen-light sized quartz UV lamp 12 that emits light in the germicidal range. In the exemplary system, the lamp 12 emits light at 254nm. The lamp is powered through ballast circuitry 13 by a battery 14, which in the exemplary system is a size AA, 3.4 volt rechargeable lithium battery. A quartz cover 16 surrounds the UV lamp 12 on three sides. The quartz cover 16 fits into a holder 18 that also acts as a shock absorber for the lamp 12. The holder 18 thus compresses and bends, as appropriate, should the cover 16, and thus, the lamp 12, bump an edge or side of a container 32 (Fig. 2) into which they are placed. In the exemplary system the holder 18 is made of silicon and forms a water-tight seal with the cover 16, to prevent water from reaching the lamp and the associated circuitry. A removable protective cover 35 protects the lamp and quartz cover when the device is not in use.

A liquid-level sensor 20, which is connected to switches (not shown) between the lamp 12, and the ballast circuitry 13 and battery 14, prevents the UV lamp from turning on until it is fully immersed in water. The UV radiation from the lamp is then absorbed and/or reflected by the water and the container such that very little of the UV radiation escapes from the container. The user, who is holding the other end 21 of the system, is thus protected from harmful levels of the UV radiation, which might otherwise adversely affect his or her eyes.

The sensor 20 may, for example, be a capacitive-type sensor that senses the difference in capacitance of the water and the surrounding air. When the sensor determines that it is in water, which necessarily means that the lamp is immersed in the water, the sensor closes the switches and allows the lamp to be turned on.

The water purifier 10 may also include a timing circuit 22

- 5 -

connected between the sensor and the lamp and associated circuitry. The timing circuit turns the lamp off a predetermined time, for example, 15 seconds, after the sensor 20 turns the lamp on.

5 The battery 14 and related circuitry are encased in a water-resistant tube 24. In the exemplary embodiment, the tube 24 is constructed of stainless steel. The entire water purifier is approximately six and three-quarters inches long and five-eighths of an inch in diameter, and fits comfortably in one hand. The tube 24 includes two parts, namely, a top 23 and a bottom 26, that screw together at a joint 25,
10 so that the battery 14 can be replaced, as necessary. A silicon O-ring 26 makes the joint 25 water-tight.

The user controls the system with an on-off switch 28. As discussed above, the lighting of the lamp 12 is ultimately controlled by the liquid-level sensor 20, such that the lamp lights only when both the
15 on-off switch 28 is in the on position and the lamp is fully immersed in water.

The water purifier 10 may also include a battery charger 30, which in the exemplary system is a conventional inductive-type charging circuit. Further, the purifier may include a power-on LED 29 and a low-
20 battery LED 31, which indicate to a user, respectively, that the UV lamp is lit and that the battery needs replacing or recharging.

Referring now to Fig. 2, a user places the lamp end 11 of the water purifier 10 in water 34 that is, in the example, contained in a drinking glass 32. The user turns the system 10 on by moving the on-off
25 switch 28 to the appropriate position. When the liquid-level sensor 20 determines that the lamp is fully immersed in the water, the sensor

- 6 -

closes the switches (not shown) that separate the ballast circuitry 13 and the battery 14 (Fig. 1) from the lamp 12, and the lamp then turns on. The sensor 20 also starts the timing circuit 22 that keeps the lamp lit for a predetermined time.

5 The user may use the lamp end 11 of the system 10 to stir the water 34, to ensure that all of the water comes sufficiently close to the source of the UV radiation. If the container is small, however, the user need not stir the water.

10 After use, the user may wipe or wash the quartz sleeve 16, to clear away any waste byproducts that may have adhered to the sleeve and may adversely affect the output level of the device. Accordingly, the hand held purifier need not include a complex wiping mechanism and associated radiation-level sensor, as is required in the prior flow-through systems.

15 The hand-held UV water purification system 10 is thus a fully portable system that disinfects relatively small quantities, or batches, of water, such as the water contained in a drinking glass. The water purifier 10 is small and light weight so that it is easily and conveniently used when traveling, hiking, camping and so forth. This is in contrast to
20 known flow-through UV water purification systems that are designed to disinfect large quantities of water for schools, hospitals and so forth. Such flow-through systems are installed such that water is piped past an elongated UV light source that is permanently suspended in the piping. These flow-through systems do not work with the small quantities of
25 water with which the hand-held portable system is expected to be used, and are not conveniently portable.

- 7 -

The foregoing description has been limited to a specific embodiment of this invention. It will be apparent, however, that variations and modifications may be made to the invention, with the attainment of some or all of its advantages. Therefore, it is the object of
5 the appended claims to cover all such variations and modifications as come within the true spirit and scope of the invention.

What is claimed is:

- 8 -

CLAIMS

Sub A1 1. A hand-held water purification system including:

- A. a case that supports the system, the case having a first end and a second end and being sized to be held in one hand;
- B. an ultraviolet lamp that extends from the first end of the case;
- C. a quartz cover that fits over the ultraviolet lamp and attaches to the case; and
- D. a battery and associated ballast circuit that fit into the case and power the lamp;

wherein the quartz cover is submerged in the water and the lamp is turned on to purify the water.

Sub B2 2. The system of claim 1 further including a liquid-level sensor that prevents the lamp from turning on until the lamp is immersed in water.

3. The system of claim 2 further including a timing circuit that turns the lamp off a predetermined time after the sensor turns the lamp on.

F 3. 4. The system of claim 2 wherein:

- a. the battery is rechargeable; and
- b. the system further includes a battery charger.

Sub A2 5. A method of purifying water that is held in a container, the method including the steps of:

- A. turning a hand-held water purification system on;
- B. immersing an ultraviolet lamp and associated quartz cover that extend from a first end of the system in the water to be purified;

- 9 -

- C. sensing that the lamp is immersed fully in the water; and
- D. turning the lamp on to emit ultraviolet radiation in the container, the radiation purifying the water.

⁴
5. The method of claim 5 further including the step of agitating the water by stirring the water with the first end of the system.

Sub 34 7. the method of claim 5 further including the step of turning the lamp off a predetermined time after the lamp is turned on.

Sub A 30 8. A method of purifying water that is held in a container, the method including the steps of:

- A. immersing an ultraviolet lamp and an associated quartz cover that form one end of a water purification system in the water to be purified;
- B. turning the lamp on to emit ultraviolet radiation in the water; and
- C. agitating the water by stirring the water with the lamp and quartz cover end of the system, the radiation from the lamp purifying the water.

Sub 36 9. The method of claim 8 further including the step of sensing that the lamp is immersed fully in the water before turning on the lamp.

10. The method of claim 5 further including the step of turning the lamp off a predetermined time after the lamp is turned on.

add A 41
10

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EXHIBIT B



DR.
8-11-97
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re The Application of:)
Maiden et al.)
Serial No. 08/790,750)
Filed: January 27, 1997)
For: HAND-HELD ULTRAVIOLET)
WATER PURIFICATION SYSTEM)

Examiner: Dawson
Art Unit: 1312

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4/A
d b:
8/12/97

CERTIFICATE OF MAILING

I hereby certify that the following Amendment is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231 on July 17, 1997.

Deborah S. Kirby

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

AMENDMENT

This is an Amendment in response to an Office Action dated June 11, 1997. Please amend claims 1, 5 and 8, and add new claim 11 as set forth below:

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AMENDED CLAIMS

- Sub B1* 1. A hand-held water purification system including:
- A. a case that supports the system, the case having an interior, an exterior a first end and a second end and being sized to be held in one hand;
 - B. an ultraviolet lamp that extends outwardly from the first end of the case;
 - A1* C. a quartz cover having a first end and a second end, the quartz cover [that fits] fitting over the ultraviolet lamp [and attaches], attaching at the first end to the case and extending outwardly from the exterior of the case; and
 - D. a battery and associated ballast circuit that fit into the interior of the case and power the lamp; wherein the quartz cover is submerged in the water and the lamp is turned on to purify the water.

- Sub B3* 5. A method of purifying water that is held in a container, the method including the steps of:
- A. turning a hand-held water purification system on;
 - A2* B. immersing in the water to be purified an ultraviolet lamp and associated quartz cover that extend outwardly from other system components and form [extend from] a first end of the system [in the water to be purified];
 - C. sensing that the lamp is immersed fully in the

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water; and

A2

- D. turning the lamp on to emit ultraviolet radiation in the container, the radiation purifying the water.

Sub B5

8. A method of purifying water that is held in a container, the method including the steps of:

A3

- A. immersing in the water to be purified an outwardly extending [an] ultraviolet lamp and [an] associated quartz cover [that form one end of a water purification system in the water to be purified];
- B. turning the lamp on to emit ultraviolet radiation in the water; and
- C. agitating the water by stirring the water with the lamp and quartz cover end of the system, the radiation from the lamp purifying the water.

NEW CLAIM

Sub E3
A4

11. The method of purifying water of claim 10 further including the step of removing the lamp and quartz cover from the container after the lamp is shut off.

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REMARKS

We have carefully considered the Office Action dated June 11, 1997 in which claims 1 and 8 are rejected as anticipated by United States Patent 4,762,613 to Snowball and the remaining claims are rejected as obvious over a combination of the Snowball reference and one or more of United States Patent 5,628,895 to Zucholl and United States Patent 5,106,495 to Hughes. We have carefully considered the comments of the Examiner and have amended certain claims to more particularly point out the current invention. We have also amended the claims for grammatical reasons.

The invention is a system for purifying water that is held in a conventional container, such as a glass, cup or bowl. Thus, the container need not be, for example, the two chambered container required by the Snowball system or the jug with the flow-through valve required by the Zucholl system.

The current system includes a cylindrical case that houses a battery, switches and so forth, and an ultraviolet lamp and associated quartz cover that extend outwardly from the case. The lamp and quartz cover form one end of the system.

The lamp and sleeve are immersed in the water that is held in the container, and the system is turned on. As desired, the lamp and cover end of the system may be used to stir the water, to ensure that all of the water that is held in the

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container comes sufficiently close to the lamp for purification.

A liquid sensor may be included in the system, to prevent the lamp from turning on before it is fully immersed in the water. A timer may also be included in the system, to turn the lamp off after a predetermined time in order to conserve battery power.

As discussed above, the Snowball system requires a two-chambered container that directs water flow from a first chamber that receives the water through a second chamber that houses an ultraviolet lamp and associated quartz sleeve. The lamp and sleeve are directed inwardly from the base of the second chamber. The water flows past them when the container is essentially up-ended, such that the water is directed from the first chamber through a passage to the base of the second chamber, and through the second chamber to an outlet at the top of that chamber.

The second chamber is dimensioned such that water entering the chamber flows close to the inwardly-directed ultraviolet lamp. To direct the flowing water in particular paths past the ultraviolet lamp, the quartz sleeve in the Snowball system may be grooved.

The Snowball system does not anticipate, teach or suggest the invention because, *inter alia*, the Snowball system does not anticipate, teach or suggest a water purification system

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that includes an ultraviolet lamp and associated quartz sleeve that extend outwardly to form an end of the system.

Accordingly, the Snowball reference does not teach or suggest the invention as set forth in claims 1 and 8, as amended, and the claims that depend therefrom.

Further, the grooved quartz sleeve of the Snowball system that re-directs the flowing water past the inwardly-directed ultraviolet lamp does not anticipate, teach or suggest the step of stirring otherwise still, i.e., non-flowing, water with an outwardly extending lamp and quartz cover end of the current system. Accordingly, the Snowball system does not anticipate, teach or suggest the method of claim 8, as amended, and the claims that depend therefrom.

The Zucholl system includes a reflective housing that contains an ultraviolet lamp. The Zucholl system further includes a jug with a valve in the bottom through which water is directed to a circulation subsystem. The reflective housing and the ultraviolet lamp contained therein are positioned above the jug, to provide both direct and reflected ultraviolet light to water that is held in the jug. Accordingly, the ultraviolet lamp is not immersed in the water.

The Zucholl reference discusses a mechanism for turning off the system, for safety reasons, when the jug is removed. However, since the Zucholl lamp is not immersed in the water

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that is held in the jug, the shut-off mechanism does not operate in the same manner as the liquid sensor of pending claims 2, 5 and 9 and the claims that depend therefrom.

A combination of the Snowball and Zucholl references does not teach or suggest the current invention because, *inter alia*, the combination does not teach or suggest a water purification system that includes an ultraviolet lamp and associated quartz sleeve that extend outwardly to form an end of the system. Accordingly, the Snowball and Zucholl references alone or in combination do not teach or suggest the invention as set forth in pending independent claims 1, 5 and 8, as amended, and the claims that depend therefrom.

The Hughes reference alone or in combination with Snowball and Zucholl references does not teach or suggest the current invention because, *inter alia*, the reference alone or in combination does not teach or suggest a water purification system that includes an ultraviolet lamp and associated quartz sleeve that extend outwardly to form an end of the system.

We have reviewed the references cited as pertinent. We agree with the Examiner that none of these references teaches or suggests the water purification of the pending claims.

In light of the foregoing, Applicants submit that all claims are now in condition for allowance. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§1.16 and 1.17 that may be required, or credit any overpayment, to

108030-0001

our Deposit Account No. 03-1237.

Respectfully submitted,



Patricia A. Sheehan
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EXHIBIT C

GAU 1312

108030-0001

PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re The Application of:
Maiden et al.

Serial No. 08/790,750

Filed: January 27, 1997

For: HAND-HELD ULTRAVIOLET
WATER PURIFICATION SYSTEM

Examiner: Dawson

Art Unit: 1312


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J.S.
11/28/97

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CERTIFICATE OF MAILING

I hereby certify that the following Amendment is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231 on November 18, 1997.


Deborah S. Kirby

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

AMENDMENT

In response to the Office Action dated October 15, 1997,
please amend claims 1, 2, 3, 5, 7, and 8-10 as set forth
below:

In the claims:

1. A hand-held water purification system including:

C' Sud
B'

B

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- B'
- A. a case that supports the system, the case having an interior, an exterior, a first end and a second end and being sized to be held in one hand;
 - B. an ultraviolet [lamp] light source that extends outwardly from the first end of the case;
 - C. [a quartz] an ultraviolet transmissive cover having a first end and a second end[, the quartz cover] and fitting over the ultraviolet [lamp] light source, the cover attaching at the first end to the case to form a water-tight enclosure for the light source and extending outwardly from [the exterior of] the case; and
 - D. a battery and associated ballast circuit that fit into the interior of the case and power the [lamp] light source;

wherein the [quartz] cover is submerged in the water and the [lamp] light source is turned on to purify the water.

B2

2. The system of claim 1 further including a liquid-level sensor that prevents the [lamp] light source from turning on until the [lamp] light source is immersed in water.

F

2. The system of claim 1 further including a timing circuit that turns the [lamp] light source off a predetermined time

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B2 after the sensor turns the [lamp] light source on.

Sub
C2

5. A method of purifying water that is held in a container, the method including the steps of:

- A. turning a hand-held water purification system on;
- B. immersing in the water to be purified an ultraviolet [lamp] light source and associated water-tight [quartz] ultraviolet transmissive cover that extend outwardly from other system components and form a first end of the system;
- C. sensing that the [lamp] light source is immersed fully in the water; and
- D. turning the [lamp] light source on to emit ultraviolet radiation in the container, the radiation purifying the water.

B3

B4 6. The method of claim ⁴ further including the step of turning the [lamp] light source off a predetermined time after the [lamp] light source is turned on.

Sub
C3

8. A method of purifying water that is held in a container, the method including the steps of:

- A. immersing in the water to be purified an outwardly extending ultraviolet [lamp] light source and associated water-tight ultraviolet transmissive

B5

13

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[quartz] cover;

- B5
- B. turning the [lamp] light source on to emit ultraviolet radiation in the water; and
- C. agitating the water by stirring the water with the [lamp] light source and [quartz] cover end of the system, the radiation from the [lamp] light source purifying the water.

16.8. The method of claim ⁹8 further including the step of sensing that the [lamp] light source is immersed fully in the water before turning on the [lamp] light source.

B6 7.10. The method of claim ⁴5 further including the step of turning the [lamp] light source off a predetermined time after the [lamp] light source is turned on.

REMARKS

We thank the Examiner for a telephone interview on November 6, 1997, in which we discussed the cited prior art and a possible amendment to the claims. In response to the Office Action and our telephone conversation with the Examiner, we have amended independent claims 1, 5 and 8 to more particularly point out that the end of the current system that is immersed in water is water-tight.

The invention is a hand-held water purification system

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that immerses an ultraviolet light source into a container of water in order to purify the water. As set forth in the independent claims, the system includes a cover that forms a water-tight enclosure for the light source, and prevents the light source from being adversely affected by the water into which it is immersed.

The Examiner cites United States Patent 4,981,651 to Horng in combination with United States Patent 4,902,411 to Lin as making obvious the current invention. The Horng patent describes an apparatus for sterilizing shoes. There is no teaching in the patent that would suggest such a system could be used for purifying water. Indeed, the Horng patent teaches away from using such a device for purifying water because, *inter alia*, the patent discusses actually drying the inner soles of the shoes as part of the sterilizing operations. (column 2, lines 39-41). Further, as discussed in column 2, lines 30-42 and lines 46 et seq., the shoe sterilizing apparatus includes holes through which heated air is driven into the shoes, to aid in the drying of the inner soles. Thus, the system does not enclose the ultraviolet lamp used for sterilization in a water-tight cover, and the lamp therefore could not be immersed in water without adverse consequences.

The Lin drinking water purifier system, like water purification systems of the previously cited prior art, includes a special-purpose container and a mechanism for

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circulating water past an ultraviolet light source. The Lin patent thus does not teach or suggest a system that purifies water that is held in a conventional container. Further, the Lin reference does not teach or suggest a system in which an ultraviolet light source and a water-tight cover form an end of the system that is immersed in the water to be purified.

A combination of the Horng and Lin patents does not teach or suggest the current invention, because, *inter alia*, it does not teach or suggest a hand-held water purification system that has as one end an ultraviolet light source that is enclosed by a water-tight cover. Further, the combination does not teach or suggest a method of purifying water that includes immersing an ultraviolet light source and a water-tight cover into a container of water, turning the light source on and, as necessary, agitating the water by stirring the water with the light source and cover.

As discussed during the interview, the inventive system includes, in its preferred embodiment, a mechanism that prevents the ultraviolet light source from turning on until the light source is fully immersed in the water. The container in which the water is housed and the water, or more precisely the air/water interface, act as a shield for the ultraviolet radiation, and thus, protect a user who is holding the device from the adverse effects of exposure to the radiation. Using the container and the water as a shield is

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discussed in the patent application on pages 3 and 4.

The claims, as amended, should now be in form for allowance. We respectfully request that the Examiner issue a Notice of Allowance for all pending claims. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§1.16 and 1.17 that may be required, or credit any overpayment, to our Deposit Account No. 03-1237.

Respectfully submitted,

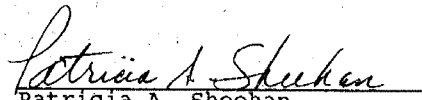

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EXHIBIT D

DEC-04-98 FRI 11:19 AM CESARI MCKENNA

FAX NO. 01185228271638

P. 04/08

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re The Application of:
Maiden et al.

Serial No. 08/790,750

Filed: January 27, 1997

For: HAND-HELD ULTRAVIOLET
WATER PURIFICATION SYSTEM

Examiner: McKane

Art Unit: 1312

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DEC 04, 1998

GROUP 1700

CERTIFICATE OF TRANSMISSION BY FACSIMILE

I hereby certify that the following Amendment is being transmitted by facsimile to the Commissioner of Patents and Trademarks, at facsimile number (703) 305-7719 on December 4, 1998.


Deborah S. Kirby

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

AMENDMENT AFTER FINAL REJECTION

In response to a telephone interview with the Examiner, we propose to cancel claim 2, and amend claims 1, 5 and 11 as set forth below:

1. A hand-held water purification system including:

A. a case that supports the system, the case having an interior, an exterior, a first end and a second end

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FAX NO. 01185228271838

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- and being sized to be held in one hand;
- B. a battery and associated ballast circuit that fit into the interior of the case and power an ultraviolet light source; [and]
- C. an ultraviolet light source and associated ultraviolet transmissive cover for immersion into non-flowing water with the light source turning on to purify the water, the ultraviolet light source extending outwardly from the first end of the case and the ultraviolet transmissive cover having a first end and a second end and fitting over the ultraviolet light source, the cover attaching at the first end to the case to form a water-tight enclosure for the light source and extending outwardly from the case; and
- D. a liquid-level sensor that prevents the light source from turning on until the light source is immersed in water.

E¹

4. ~~B.~~ A method of purifying water that is held in a container, the method including the steps of:

- A. turning a hand-held water purification system on;
- B. holding the system by hand, so as to immerse [immersing] in the water to be purified, an ultraviolet light source and associated water-tight ultraviolet transmissive cover that are part of the hand-held water purification system and extend
- E²

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outwardly from other system components to form a first end of the system;

C. sensing that the light source is immersed fully in the water;

E2 D. turning the light source on to emit ultraviolet radiation in the container, the radiation purifying the water; and

E. turning the light source off and removing the light source and associated cover from the water after a predetermined time associated with purifying the water.

E3 8. ~~11~~⁷. The method of purifying water of claim ~~10~~⁷ further including the step of removing the lamp and water-tight ultraviolet transmissive [quartz] cover from the container after the lamp is shut off.

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REMARKS

We would like to thank the Examiner for a telephone interview that began on November 30, 1998 and continued on December 2, 1998, in which we discussed allowable subject matter, the previously cited prior art, and a newly cited United States Patent 1,965,947 to Prouty. As discussed, the method claims, including claim 5 as amended above, include allowable subject matter, and a claim 1, amended to include the subject matter of claim 2, namely, a liquid level sensor, includes allowable subject matter. We also discussed a corrective amendment to claim 11.

We agree that claim 1 amended as set forth above is allowable. However, we disagree that the subject matter of claim 1, without amendment, is obvious over the previously and newly cited prior art. Accordingly, we make the proposed amendment set forth above to move the application to allowance, and we intend to file a continuation application to pursue broader claims.

The claims, as amended, should now be in form for allowance. We respectfully request that the Examiner enter this Amendment and issue a Notice of Allowance for all pending

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claims. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§1.16 and 1.17 that may be required, or credit any overpayment, to our Deposit Account No. 03-1237.

Respectfully submitted,



Patricia A. Sheehan
Reg. No. 32,301
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EXHIBIT E



PATENTS
108030-0001C1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re The Application of:
Miles Maiden et al.

Serial No.: 09/256,054

Filed: February 23, 1999

For: HAND-HELD ULTRAVIOLET
WATER PURIFICATION SYSTEM

Examiner: McKane

Art Unit: 1744

Cesari and McKenna, LLP
30 Rowes Wharf
Boston, MA 02110
June 23, 1999

Honorable Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

AMENDMENT

In response to the Office Action dated April 14, 1999 please amend the claims as follows:

10. The method of claim [5] 8 further including the step of turning the lamp off a predetermined time after the lamp is turned on.

NEW CLAIMS

11. A hand-held system for purifying water, the system including:

A. a drinking container for holding the water;

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- sub C17
- B. a case with an outwardly extending ultraviolet lamp, the lamp for submer-
sion in the water that is held in the drinking container to provide ultravio-
let emissions that purify the water;
 - C. a quartz cover that fits over the ultraviolet lamp and connects to the case to
protect the lamp from the water; and
 - D. means for turning on the lamp, the means contained in the case.

12. The system of claim 11 further including a liquid-level sensor that prevents the lamp
from turning on until the lamp is immersed in water.

13. The system of claim 12 further including a timing circuit that turns the lamp off a
predetermined time after the sensor allows the lamp to turn on.

A2 14. The system of claim 12 wherein the means for turning on the lamp includes a battery.

15. The system of claim 14 wherein the battery is rechargeable and the system further
includes a battery charger.

16. A method of purifying water that is held in a container, the method including the
steps of:

- sub C87
- A. immersing an ultraviolet lamp and an associated quartz cover that form
one end of a water purification system in the water to be purified;
 - B. turning the lamp on to emit ultraviolet radiation in the water to purify the
water; and
 - C. agitating the water to expose all of the water in the container to the ultra-
violet radiation.

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17. The method of claim 16 further including the step of sensing that the lamp is immersed fully in the water before turning on the lamp.

18. The method of claim 16 further including the step of turning the lamp off a predetermined time after the lamp is turned on.

19. The method of claim 16 wherein the step of agitating the water includes agitating the water with the immersed ultraviolet lamp.

REMARKS

A2
gdc

We disagree that the invention as set forth in claims 1, 5 and 7 is obvious in light of United States Patent 5,276,256 to Karamian. The '256 patent relates to a system for preventing bacterial passage into a *sterile* fluid. Accordingly, the system described in the '256 patent does not initially sterilize, or purify, the fluid, and there is no teaching or suggestion that the system would allow unsterilized fluid into the system and/or that the system could purify the unsterile fluid with the included UV light source. Indeed, as stated in the '256 patent, the principal object of that system is "to provide an apparatus for preventing bacterial contamination of water or other fluids *that have been previously treated to assure that they are sterile...*" (col. 1, lines 64-66 emphasis added). Accordingly, there is an implicit teaching that the system described in the '256 patent cannot be used to initially sterilize the water or fluid supply.

The '256 patent teaches a system that prevents recontamination of the sterile fluid by controlling bacterial build-up and growth at valves or faucets in a path through which the sterile fluid flows (col. 2, lines 1-6). Accordingly, the '256 system provides UV radiation to the valves or faucets, and to the relatively small amount of accumulated fluid at

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the valves or faucets, and not directly to the fluid supply. The fluid supply is instead held in a supply vessel that is not shown in the drawings (col. 2, lines 23-28), and there is no mention of how the fluid initially becomes sterile.

There is also no teaching or suggestion in the '256 patent that the UV lamp could be hand-held, particularly since the placement of the lamp in the fluid path relative to the associated stopcock is *the essential feature* of the system (col. 2, lines 28-34).

We further disagree that claims 6 and 8-10 are obvious over a combination of the '256 patent and United States Patent 5,173,269 to Mon et al.

The '269 patent describes a system that reduces the reactivity of toxic articles destined for disposal by curing a residue of a toxic fluid into a *relatively harmless solid* (col. 4, lines 37-44). See, also, col. 2, lines 31-33; col. 3, lines 50-54; col. 4, lines 34-36 of the '269 patent. The goal of the '269 system, which is to harden the residue in the container in which it resides (col. 2, lines 22-33), is completely incompatible with water purification.

The '269 system is described as working with UV curable materials, such as curable acrylate materials (Abstract), vinyl materials and so forth (col. 6, lines 44 et seq.) and materials that are used in "floor coverings, printing inks, furniture coverings, particle board, adhesives, printed wire circuit boards, and aircraft and automotive composites (col. 7, lines 1-4). The '269 system is thus used in environments in which the users must wear protective equipment such as gloves, coveralls, safety glasses and a respirator (col. 1, lines 39-43; col. 4 lines 44 et seq.). There is no teaching or suggestion that the

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system be used with a non-toxic, non-curable fluid, let alone with what will ultimately become potable water.

The container into which the '269 system is inserted is essentially emptied of fluid before the system is inserted therein (col. 4, lines 28-36). Accordingly, the UV light lamps are not immersed in a fluid. Further, while the '269 system may be moved relative to the residue that remains in the container, the system does not agitate, or stir, the residue. Accordingly, the '269 patent does not teach or suggest any of the method steps of claim 8 and, in particular, it does not teach or suggest the step of agitating the supply of water during purification as set forth in independent claims 8 and 16 and dependent claim 6.

The Federal Circuit requires a teaching, suggestion or motivation, other than what is taught by the invention, in order to combine references for an obviousness rejection. See, *In re Rouffet* 47 USPQ2d 1453, 1456 (Fed. Cir. 1998); *In re Oetiker* 24 USPQ2d 1443, 1446, (Fed. Cir. 1992); *In re Laskowski*, 10 USPQ2d 1397, (Fed. Cir. 1989). As discussed above, there is no teaching or suggestion to combine the systems of the '256 and '269 patents. Further, there is no motivation to combine teachings relating to the hardening of reactive, toxic residue, with teachings relating to the preventing of recontamination of a sterile fluid. Accordingly, a combination of these references should not be cited against the claims of the pending application.

The invention as a whole must be considered when evaluating obviousness, including the particular problem that is solved by the invention. See, *In re Oetiker* 24 USPQ2d 1443; *In re Laskowski* 10 USPQ2d 1397; *In re Wright* 6 USPQ2d 1959 (Fed.

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Cir. 1988). The Federal Circuit requires that a reference relied on for an obviousness rejection must be directed to the same field of endeavor as the invention or, if not, it must be "reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker* at 1445. The problem solved by the current invention is the purification of unsterile water. It is not the prevention of recontamination of an already sterile fluid to which the '256 patent is directed. Further, it is not the hardening of reactive, toxic residue to which the '269 patent is directed. Indeed, the '269 patent is not directed to water purification at all and is thus not within the appropriate field of endeavor to be considered relevant to an obviousness rejection. Accordingly, either or both of these patents do not render the current system obvious, even if some aspects of the structure or method of use of the systems are arguably similar to those of the current system.

Even if there is some way in which the unrelated teachings of the two patented systems can be properly combined, the combination does not teach or suggest the current invention. Specifically, the teachings of the '269 patent add to the '256 system the use of a special configuration of UV lamps to provide more UV radiation to a faucet or valve in a path through which a sterile fluid flows. The combination does not teach or suggest the current invention because, *inter alia*, the combination does not teach or suggest a hand-held water purification system or method in which an outwardly extending UV light source is immersed in a supply of unsterile water and then turned on to purify the water, as set forth in the pending independent claims and the claims that depend therefrom.

The current system satisfies essentially all of the criteria for non-obviousness as set forth by the Federal Circuit. See, in *In re Rouffet* at 1456, and the cases cited therein.

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As discussed in a response in the parent application, the results produced by the current system were surprising to one skilled in the art, as set forth in the Declaration of Anne Hanson (copy enclosed).

The device also solves a problem that meets a long felt need, namely, an effective, non-chemical hand-held water purification system. The Assignee of the patent application has been inundated with requests for the device ever since the device was featured in *Newsweek* magazine in October 1998, as discussed in the enclosed Declaration of Miles Maiden. The current system has also received tremendous amounts of unsolicited publicity in publications and on television world-wide. Further, the system is the subject of many standing requests to feature the device in print and on television.

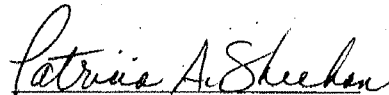
All of this unsolicited publicity is occurring even *before* the device has hit the market. If the system did not solve a previously unsolved, long-felt problem, the system would not be receiving such unsolicited publicity. Further, if the system were obvious, it would have been on the market long before, given the high level of interest.

The claims should now be in form for allowance, and we ask that the Examiner reconsider her rejections and issue a Notice of Allowance.

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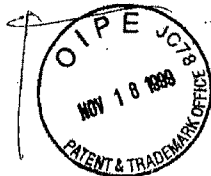
Please charge any fee occasioned by this paper to our Deposit Account No. 03-
1237.

Respectfully submitted,

A handwritten signature in cursive script, reading "Patricia A. Sheehan".

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EXHIBIT F



D. Hapner
#9/C
PATENTS
108030-0000
11/30/99

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re The Application of:
Miles Maiden et al.

Serial No.: 09/256,054

Filed: February 23, 1999

For: HAND-HELD ULTRAVIOLET
WATER PURIFICATION SYS-
TEM

Examiner: McKane

Art Unit: 1744

Cesari and McKenna, LLP
30 Rowes Wharf
Boston, MA 02110
November 18, 1999

Honorable Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

AMENDMENT

In response to the Office Action dated August 3, 1999, please cancel claim 1,
amend claims ~~2, 3, 5, 7-14, and 16-19~~ and add new claims 20-28 as follows:

AMENDED CLAIMS

C1 17. The system of claim [1] ~~20~~ further including a liquid-level sensor that prevents the
[lamp] light source from turning on until the [lamp] light source is immersed in water.

18 18. The system of claim ~~2~~ ¹⁷ further including a timing circuit that turns the [lamp] light
source off a predetermined time after the sensor turns the [lamp] light source on.

C2 5. A method of purifying a batch of unsterilized water that is held in a container, the
method including the steps of:

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- 1
- A. turning a hand-held water purification system on;
 - B. immersing an ultraviolet [lamp] light source and associated ultraviolet transmissive cover that extend from a first end of the system in the batch of unsterilized water [to be purified];
 - C. sensing that the [lamp] light source is immersed fully in the unsterilized water; [and]
 - D. turning the [lamp] light source on to emit ultraviolet radiation in the batch of unsterilized water in the container, the radiation purifying the water.

C3 3. The method of claim 1 further including the step of turning the [lamp] light source off a predetermined time after the [lamp] light source is turned on.

4. A method of purifying water that is held in a container, the method including the steps of:

- C4
- A. immersing an ultraviolet [lamp] light source and an associated ultraviolet transmissive cover that form one end of a water purification system in the water to be purified;
 - B. turning the [lamp] light source on to emit ultraviolet radiation in the water; and
 - C. agitating the water by stirring the water with the [lamp] light source and cover end of the system, the radiation from the [lamp] light source purifying the water.

C5 5. The method of claim 4 further including the step of sensing that the [lamp] light source is immersed fully in the water before turning on the [lamp] light source.

C6 6. The method of claim 4 further including the step of turning the [lamp] light source off a predetermined time after the [lamp] light source is turned on.

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7. A hand-held system for purifying unsterilized water, the system including:

- A. a drinking container having at one end an opening through which water both enters and exits the container and a second closed end for holding the water in the container;
- B. a case with an outwardly extending ultraviolet [lamp] light source, the [lamp] light source for submerging [submersion] in the unsterilized water that is held in the drinking container [to provide] and providing ultraviolet emissions that purify the unsterilized water,
- C. [an ultraviolet transmissive cover that fits over the ultraviolet lamp and connects to the case to protect the lamp from the water; and] control means for turning [on] the [lamp] light source on and off, the control means being contained in the case.

8. The system of claim 7 further including a liquid-level sensor that prevents the [lamp] light source from turning on until the [lamp] light source is immersed in water.

9. The system of claim 8 further including a timing circuit that turns the [lamp] light source off a predetermined time after the sensor allows the [lamp] light source to turn on.

10. The system of claim 8 wherein the means for turning on the [lamp] light source includes a battery.

16. A method of purifying water that is held in a container, the method including the steps of:

- A. immersing an ultraviolet [lamp] light source and an associated quartz cover that form one end of a water purification system in the water to be purified;

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B. turning the [lamp] light source on to emit ultraviolet radiation in the water to purify the water; and

C. agitating the water to expose all of the water in the container to the ultraviolet radiation.

¹³17. The method of claim ¹²16 further including the step of sensing that the [lamp] light source is immersed fully in the water before turning on the [lamp] light source.

¹⁴18. The method of claim ¹²16 further including the step of turning the [lamp] light source off a predetermined time after the [lamp] light source is turned on.

¹⁵19. The method of claim ¹²16 wherein the step of agitating the water includes agitating the water with the immersed ultraviolet [lamp] light source.

NEW CLAIMS

¹⁶20. A hand-held water purification system for purifying unsterilized water in batches, the system including:

- A. an ultraviolet light source;
- B. an ultraviolet transmissive cover that fits over the light source;
- C. power means for supplying power to the light source; and
- D. a case that contains the power means and connects to the ultraviolet transmissive cover to form a water-tight enclosure for the ultraviolet light and the power means.

²⁰21. The system of claim ¹⁶20 wherein the power means includes a battery and an associated ballast circuit.

²¹22. The system of claim ¹⁶20 wherein the case includes

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- a. a first section and a second section that separate to provide access to the power means, and
- b. sealing means for making a water-tight seal between the first and second sections.

²² 23. The system of claim ²¹ 22 wherein the sealing means is a gasket.

²³ 24. The system of claim ¹⁶ 23 further including in the case a control means for switching the ultraviolet light source on to purify a batch of unsterilized water and thereafter switching the light source off.

²⁴ 25. A hand-held system for purifying unsterilized water, the system including:

- A. a case with an outwardly extending ultraviolet light source, the light source for submerging in the unsterilized water and providing ultraviolet emissions that purify the unsterilized water,
- B. control means for turning the light source on and off, the control means being contained in the case.
- C. an ultraviolet transmissive cover that fits over the ultraviolet lamp and connects to the case in a water-tight manner to protect the lamp and the control means from the water.

²⁵ 26. The system of claim ²⁴ 25 wherein the control means includes

- a. a switch; and
- b. a timer for operating the switch to turn the light source off a predetermined time after the light source turns on.

²⁶ 27. A method of purifying a batch of unsterilized water that is held in a container, the method including the steps of:

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- A. immersing an ultraviolet light source and an associated ultraviolet transmissive cover that form one end of a water purification system in the batch of unsterilized water that is held in the container;
- B. turning the light source on to emit ultraviolet radiation in the batch of unsterilized water in order to sterilize the water;
- C. turning the light source off; and
- D. removing the light source from the batch of water held in the container.

27 26
28. The method of claim 27 wherein the step of turning the light source off further includes turning the light source off a predetermined time after turning the light source on.

REMARKS

We thank the Examiner for the recent interview and discussion of the pending claims and the cited prior art. We have carefully considered the Office Action dated August 3, 1999 and in response to the Office Action and the interview, we have canceled claim 1 and replaced it with new claim 20, added new claims 21 - 28 and amended claims 5 and 11 as set forth above. We have also amended various other claims for consistency purposes. As discussed in the interview, we are filing herewith a terminal disclaimer to overcome the double patenting rejection.

Claims 5 and 11 are amended to more particularly point out that the ultraviolet light source of the current system is immersed in a batch of unsterilized water and turned on to sterilize the batch of water. This is in contrast to the system discussed in the Karamian patent, in which the water in the system is sterilized *before* it enters the system. The lamp in the Karamian system is thus not used to sterilize a batch of unsterilized water. Further, there is no teaching or suggestion of using the lamp in the Karamian system in such a manner. Accordingly, the Karamian patent does not teach

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or suggest the invention of amended claims 5 and 11, the claims that depend therefrom, or new claims 27 and 28.

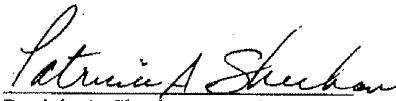
Claim 20 replaces claim 1 and more particularly points out that a case that encloses both the ultraviolet light source and the associated power means protects both from the water. In contrast, the Karamian system includes an apparatus 12 that is shaped specifically to hold one end of the lamp in the path of the sterile water, and the other end of the lamp out of the path of the water. The end of the lamp that is held out of the path of the water is the one that, through a cord indicated in the drawings, connects the lamp to whatever circuitry provides power to the lamp. With this connection end of the lamp and the power circuitry held out of the water, there is no teaching or suggestion to include in the Karamian system a case that assembles in a water-tight manner to protect the lamp, the power circuitry and any interconnections from the water. Accordingly, the Karamian patent does not teach or suggest the system of claim 20 and the claims that depend therefrom. Further, there is no teaching or suggestion in the Karamian patent of a case that protects from the water both the lamp and the control circuitry that turns the lamp on and off, as set forth in new claim 25 and the claims that depend therefrom.

The claims as amended should now be in form for allowance. We request that the Examiner reconsider her rejections and issue a Notice of Allowance for all pending claims.

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Please charge any additional fee occasioned by this paper to our Deposit Account
No. 03-1237.

Respectfully submitted,



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EXHIBIT G
(FILED UNDER SEAL)